

ETHANE

CM I claim:

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1. A process for preventing, controlling and extinguishing fire in an enclosed air-containing area which contains combustible materials of the non-self-sustaining type, which comprises introducing into the air in said enclosed area an amount of at least one fluoro-substituted ethane selected from the group of  $\text{CF}_3\text{-CHF}_2$ ,  $\text{CHF}_2\text{-CHF}_2$ ,  $\text{CF}_3\text{-CH}_2\text{F}$ ,  $\text{CF}_3\text{-CHFCl}$  and  $\text{CF}_2\text{Cl-CF}_2\text{H}$  sufficient to impart a heat capacity per mol of total oxygen that will suppress combustion of the combustible materials in said enclosed area.
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2. A process as in Claim 1 wherein the amount of said ethane in said enclosed area is maintained at a level of about 10 to 100 volume percent.
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3. A process as in Claim 1 wherein the amount of said ethane in said enclosed area is maintained at about 20 volume percent.
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4. A process as in Claim 1 wherein at least 1% of at least one halogenated hydrocarbon is blended with said ethane introduced into said enclosed area, said halogenated hydrocarbon being selected from the group consisting of difluoromethane, chlorodifluoromethane, 2,2-dichloro-1,1,1-trifluoroethane, 1,2-dichloro-1,1,2-trifluoroethane, 2-chloro-1,1,1,2-tetrafluoroethane, 1-chloro-1,1,2,2-tetrafluoroethane, pentafluoroethane, 1,1,2,2-tetrafluoroethane, 1,1,1,2-tetrafluoroethane, 3,3-dichloro-1,1,1,2,2-pentafluoropropane, 1,3-dichloro-1,1,2,2,3-pentafluoropropane, 2,2-dichloro-1,1,1,3,3-pentafluoropropane,
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CH-1762

2,3-dichloro-1,1,1,3,3-pentafluoropropane,  
1,1,1,2,2,3,3-heptafluoropropane, 1,1,1,2,3,3,3-hepta-  
fluoropropane, 1,1,1,2,3,3-hexafluoropropane,  
1,1,1,3,3,3-hexafluoropropane, 1,1,1,2,2,3-hexafluoro-  
5 propane, 1,1,2,2,3,3-hexafluoropropane, 1,2-dichloro-  
1,2-difluoroethane, 1,1-dichloro-1,2-difluoroethane,  
3-chloro-1,1,2,2,3-pentafluoropropane,  
3-chloro-1,1,1,2,2-pentafluoropropane,  
1-chloro-1,1,2,2,3-pentafluoropropane,  
10 3-chloro-1,1,1,3,3-pentafluoropropane,  
3-chloro-1,1,1,2,2,3-hexafluoropropane,  
1-chloro-1,1,2,2,3,3-hexafluoropropane,  
2-chloro-1,1,1,3,3,3-hexafluoropropane,  
3-chloro-1,1,1,2,3,3-hexafluoropropane, and  
15 2-chloro-1,1,1,2,3,3-hexafluoropropane.

5. A process for extinguishing a fire which  
comprises introducing a volume of at least one  
fluoro-substituted ethane selected from the group of  
20  $\text{CF}_3\text{-CHF}_2$ ,  $\text{CHF}_2\text{-CHF}_2$ ,  $\text{CF}_3\text{-CH}_2\text{F}$ ,  $\text{CF}_3\text{-CHFCl}$  and  $\text{CF}_2\text{Cl-CF}_2\text{H}$   
sufficient to provide an extinguishing concentration in  
an enclosed area, and maintaining said concentration at  
a value of less than 80 volume percent until said fire  
is extinguished.

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6. A process as in Claim 5 wherein at least  
1% of at least one halogenated hydrocarbon is blended  
with said ethane introduced into said enclosed area,  
said halogenated hydrocarbon being selected from the  
30 group consisting of difluoromethane, chlorodifluoro-  
methane, 2,2-dichloro-1,1,1-trifluoroethane,  
1,2-dichloro-1,1,2-trifluoroethane,  
2-chloro-1,1,1,2-tetrafluoroethane,  
1-chloro-1,1,2,2-tetrafluoroethane, pentafluoroethane,  
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1,1,2,2-tetra-fluoroethane, 1,1,1,2-tetrafluoroethane,  
3,3-dichloro-1,1,1,2,2-pentafluoropropane,  
1,3-dichloro-1,1,2,2,3-pentafluoropropane,  
2,2-dichloro-1,1,1,3,3-pentafluoropropane,  
5 2,3-dichloro-1,1,1,3,3-pentafluoropropane,  
1,1,1,2,2,3,3-heptafluoropropane, 1,1,1,2,3,3,3-hepta-  
fluoropropane, 1,1,1,2,3,3-hexafluoropropane,  
1,1,1,3,3,3-hexafluoropropane, 1,1,1,2,2,3-hexafluoro-  
propane, 1,1,2,2,3,3-hexafluoropropane, 1,2-dichloro-  
10 1,2-difluoroethane, 1,1-dichloro-1,2-difluoroethane,  
3-chloro-1,1,2,2,3-pentafluoropropane,  
3-chloro-1,1,1,2,2-pentafluoropropane,  
1-chloro-1,1,2,2,3-pentafluoropropane,  
3-chloro-1,1,1,3,3-pentafluoropropane,  
15 3-chloro-1,1,1,2,2,3-hexafluoropropane,  
1-chloro-1,1,2,2,3,3-hexafluoropropane,  
2-chloro-1,1,1,3,3,3-hexafluoropropane,  
3-chloro-1,1,1,2,3,3-hexafluoropropane, and  
2-chloro-1,1,1,2,3,3-hexafluoropropane.

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7. A fire extinguishing composition  
comprising at least 8 volume percent of at least one  
fluoro-substituted ethane selected from the group of  
CF<sub>3</sub>-CHF<sub>2</sub>, CHF<sub>2</sub>-CHF<sub>2</sub>, CF<sub>3</sub>-CH<sub>2</sub>F, CF<sub>3</sub>-CHFCl and  
25 CF<sub>2</sub>Cl-CHF<sub>2</sub>.

8. The composition of Claim 7 wherein at  
least 1% of at least one halogenated hydrocarbon is  
blended with said ethane introduced into said enclosed  
30 area, said halogenated hydrocarbon being selected from  
the group consisting of difluoromethane,  
chlorodifluoromethane, 2,2-dichloro-1,1,1-trifluoro-  
ethane, 1,2-dichloro-1,1,2-trifluoroethane, 2-chloro-  
1,1,1,2-tetrafluoroethane,  
35 1-chloro-1,1,2,2-tetrafluoroethane, pentafluoroethane,

1,1,2,2-tetrafluoroethane, 1,1,1,2-tetrafluoroethane,  
3,3-dichloro-1,1,1,2,2-pentafluoropropane,  
1,3-dichloro-1,1,2,2,3-pentafluoropropane,  
2,2-dichloro-1,1,1,3,3-pentafluoropropane,  
2,3-dichloro-1,1,1,3,3-pentafluoropropane,  
1,1,1,2,2,3,3-heptafluoropropane, 1,1,1,2,3,3,3-hepta-  
fluoropropane, 1,1,1,2,3,3-hexafluoropropane,  
1,1,1,3,3,3-hexafluoropropane, 1,1,1,2,2,3-hexafluoro-  
propane, 1,1,2,2,3,3-hexafluoropropane, 1,2-dichloro-  
1,2-difluoroethane, 1,1-dichloro-1,2-difluoroethane,  
3-chloro-1,1,2,2,3-pentafluoropropane,  
3-chloro-1,1,1,2,2-pentafluoropropane,  
1-chloro-1,1,2,2,3-pentafluoropropane,  
3-chloro-1,1,1,3,3-pentafluoropropane,  
3-chloro-1,1,1,2,2,3-hexafluoropropane,  
1-chloro-1,1,2,2,3,3-hexafluoropropane,  
2-chloro-1,1,1,3,3,3-hexafluoropropane,  
3-chloro-1,1,1,2,3,3-hexafluoropropane, and  
2-chloro-1,1,1,2,3,3-hexafluoropropane.

9. A fire extinguishing composition comprising at least one of fluoro-substituted ethane selected from the group of  $\text{CF}_2\text{-CF}_2\text{H}$ ,  $\text{CHF}_2\text{-CHF}_2$ ,  $\text{CF}_3\text{-CH}_2\text{F}$ ,  $\text{CF}_3\text{CHFCl}$ ,  $\text{CF}_2\text{Cl-CHF}_2$ ,  $\text{CF}_3\text{-CHCl}_2$ ,  $\text{CF}_2\text{Cl-CHFC1}$ ,  $\text{CFC1}_2\text{-CH}_2\text{F}$  and  $\text{CHFC1-CHFC1}$ .

10. The composition of claim 9 wherein nitrogen or any other propellant usually used in portable fire extinguishers is added in sufficient quantity to provide a pressure of at least 140 psig in said portable fire extinguisher.

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311. The composition of Claim 9 wherein at least 1% of at least one halogenated hydrocarbon is blended with said ethane, said halogenated hydrocarbon being selected from the group consisting of

5 difluoromethane, chlorodifluoromethane, 2,2-dichloro-1,1,1-trifluoroethane, 1,2-dichloro-1,1,2-trifluoroethane, 2-chloro-1,1,1,2-tetrafluoroethane, 1-chloro-1,1,2,2-tetrafluoroethane, pentafluoroethane, 1,1,2,2-tetrafluoroethane, 1,1,1,2-tetrafluoroethane,  
10 3,3-dichloro-1,1,1,2,2-pentafluoropropane, 1,3-dichloro-1,1,2,2,3-pentafluoropropane, 2,2-dichloro-1,1,1,3,3-pentafluoropropane, 2,3-dichloro-1,1,1,3,3-pentafluoropropane, 1,1,1,2,2,3,3-heptafluoropropane, 1,1,1,2,3,3,3-heptafluoropropane, 1,1,1,2,3,3,3-hexafluoropropane,  
15 1,1,1,3,3,3,3-hexafluoropropane, 1,1,1,2,2,3,3-hexafluoropropane, 1,2-dichloro-1,2-difluoroethane, 1,1-dichloro-1,2-difluoroethane, 3-chloro-1,1,2,2,3-pentafluoropropane,  
20 3-chloro-1,1,1,2,2-pentafluoropropane, 1-chloro-1,1,2,2,3-pentafluoropropane, 3-chloro-1,1,1,3,3-pentafluoropropane, 3-chloro-1,1,1,2,2,3-hexafluoropropane, 1-chloro-1,1,2,2,3,3-hexafluoropropane,  
25 2-chloro-1,1,1,3,3,3-hexafluoropropane, 3-chloro-1,1,1,2,3,3-hexafluoropropane, and 2-chloro-1,1,1,2,3,3-hexafluoropropane.

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412. The composition of Claim 11 wherein  
30 nitrogen or any other propellant usually used in portable fire extinguishers is added in sufficient quantity to provide a pressure of at least 140 psig in said portable fire extinguisher.